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AUTHOR	Webb, Noreen M.; Farivar, Sydney H.; Mastergeorge, Ann M.
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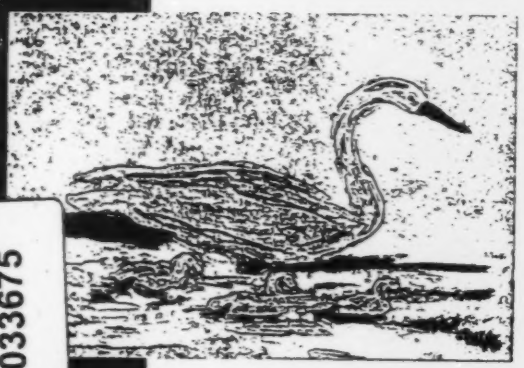
Noreen M. Webb
CRESST/University of California

Sydney H. Farivar
California State University, Northridge

Ann M. Mastergeorge
Center for the Study of Evaluation, UCLA



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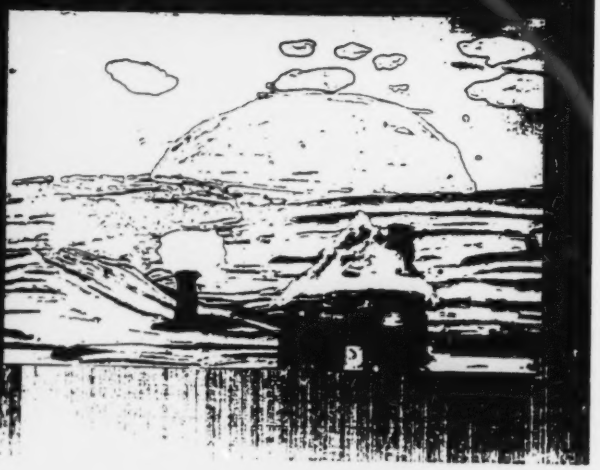

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Noreen M. Webb
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California State University, Northridge

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Center for the Study of Evaluation
National Center for Research on Evaluation,
Standards, and Student Testing
Graduate School of Education & Information Studies
University of California, Los Angeles
Los Angeles, CA 90095-1522
(310) 206-1532

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PRODUCTIVE HELPING IN COOPERATIVE GROUPS

Noreen M. Webb
CRESST/University of California

Sydney H. Farivar
California State University, Northridge

Ann M. Mastergeorge
Center for the Study of Evaluation, UCLA

Abstract

The past 20 years have seen a tremendous increase in the use of peer-directed collaborative group work both in classroom instruction and in assessments to give students an opportunity to learn from each other. Using examples drawn from a program of peer learning in middle school mathematics, this paper identifies a set of helping behaviors that best predict learning in collaborative small groups. Specifically, this paper describes conditions that must be satisfied for helping behavior to be effective and the responsibilities of students seeking help, students giving help, and teachers to make helping productive for learning.

The past 20 years have seen a tremendous increase in the use of peer-directed small-group work. Not only is group work used widely in classrooms to improve student learning; large-scale assessment programs and small-scale, in-class assessments increasingly use collaborative small-group work in which students work together to solve problems or complete projects (e.g., the California Assessment Program: Awbrey, 1992; Bartlett, 1992; Pandey, 1991; the California Learning Assessment System: Saner, McCaffrey, Stecher, Klein, & Bell, 1994; Connecticut's Common Core of Learning Assessment: Baron, 1994; Connecticut State Board of Education, 1987; Lomask, Baron, Greigh, & Harrison, 1992; and the Oregon State Department of Education: Neuberger, 1993; Shavelson & Baxter, 1992). In addition, emerging state and national standards for assessment often include recommendations for the incorporation of small-group work (e.g., Kansas State Board of Education, 1993; Mathematical Sciences Education Board, National Research Council, 1993).

Although assessment programs build in opportunities for collaborative work most often in science, peer collaboration is also used for reading, writing, and interdisciplinary tasks. Collaborative science assessments usually have small groups

design, carry out, interpret, and summarize an experiment or investigation prior to follow-up questions that students answer individually (e.g., Baron, 1994; Maryland State Department of Education, 1994; Saner et al., 1994). The interdisciplinary task on the 10th-grade Connecticut Academic Performance Test (CAPT, Connecticut State Board of Education, 1996) has small groups of students discuss a controversial issue (e.g., funding the development of a space station) prior to reading source materials and writing a persuasive essay supporting their position. In an extended writing task on the Maryland School Performance Assessment Program (MSPAP, Maryland State Department of Education, 1994), students provide feedback about each other's writing (e.g., a speech to persuade citizens in a 1912 town about the pros or cons of child labor) before they write their final drafts. In a social studies and language arts task on the MSPAP, students discuss a topic (e.g., the function of different workers in a community) in small groups in preparation for answering questions individually. A pilot version of the language arts component of the CAPT had students discuss a piece of literature partway through a series of questions that students answered individually (Wise & Behuniak, 1993). The collaborative portions of these assessments provide opportunities for students to learn from each other. Using collaboration in assessments of achievement can increase student performance on the assessments, as well as provide an opportunity for longer term learning, by providing access to a wider range of intellectual resources than would be available during individual testing (Fall, Webb, & Chudowsky, 2000; Neuberger, 1993; Webb, Nemer, Chizhik, & Sugrue, 1998).

Students can learn from each other in many ways—for example, by giving and receiving help, by recognizing and resolving contradictions between their own and other students' perspectives, and by internalizing problem-solving processes and strategies that emerge during group work (Bearison, Magzamen, & Filardo, 1986; Brown & Palincsar, 1989; Webb & Palincsar, 1996). This paper focuses on the mechanism of helping behavior, specifically the exchange of explanations about the content being learned. We describe several conditions that must be satisfied for help to be effective, and we describe the responsibilities of the help-seeker, the help-giver, and the teacher to make helping productive for learning. These findings have important implications for collaborative work among students, whether the context is regular classroom instruction or assessment of achievement.

Our examples are drawn from a study of a semester-long program of peer learning in middle school mathematics classrooms (Mastergeorge, Webb, Roc, &

Baure, 2000; Webb & Farivar, 1999;). The cooperative learning program was conducted in six 7th-grade classes for three 4-week phases spread out over the course of the semester, with each unit corresponding to a curriculum unit (decimals, fractions, percents). Prior to each phase, classes participated in activities designed to help students work effectively in small groups. Although students were given instruction and practice in developing communications and helping skills, their group work was fairly unstructured. At the beginning of each class period, the teacher introduced the whole class to the day's material and solved a few example problems with the class. The teacher then assigned problems for students to solve in small, heterogeneous groups. Students were reminded to work together and help each other, to make sure that they agreed on their answers, and to consult each other before asking the teacher for help. Groups were tape recorded as they worked and were tested on the material (with individual tests) several weeks later.

Conditions for Effective Helping

When and how exchanging help promotes learning is not fully understood. From a theoretical perspective, both the help-giver and the help-receiver stand to benefit from *elaborated* help (e.g., explanations). Formulating explanations (e.g., step-by-step descriptions of how to solve problems) encourages explainers to clarify and reorganize the material in their own minds to make it understandable to others (Bargh & Schul, 1980) and, in the process, should help them develop new perspectives, and recognize and fill in gaps in their understanding. Receiving explanations can help receivers fill in gaps in their understanding, correct misconceptions, and strengthen connections between new information and previous learning (Mayer, 1984; Wittrock, 1990). Peers may be more effective explainers than adults because peers share a similar language and can translate difficult vocabulary and expressions into language that fellow students can understand (Noddings, 1985). Giving and receiving *non-elaborated* help (e.g., only the final answer), on the other hand, is expected to have fewer benefits because it may not involve cognitive restructuring or clarifying on the part of the help-giver, and probably will not enable help-receivers to correct their misconceptions or lack of understanding.

While previous research has found that *giving* explanations is usually positively related to achievement, the results from empirical research on the relationship between *receiving* explanations and learning are inconsistent and weak (Webb & Palincsar, 1996). Receiving a response that has *no* elaboration is usually

negatively related to achievement, but receiving elaborated explanations does not often seem to benefit the receiver (Webb, 1989).

The missing link may be that additional conditions must be satisfied for help received to be effective. First, explanations themselves must satisfy four conditions. They must be (a) relevant to the target student's need for help, (b) timely, (c) correct, and (d) sufficiently elaborated to enable the target student to correct his or her misconception or lack of understanding (i.e., detailed explanations, not just the answer). In our study, the help that students gave each other varied a great deal in terms of detail, ranging from detailed explanations with the numbers verbally labeled to no detail at all. Table 1 gives a continuum of detail with examples from one of the topics discussed in groups. Students were asked to solve problems such as "Find the cost of a 30-minute telephone call to prefix 771 where the first minute costs $0.22 and each additional minute costs $0.13." The level of help received was significantly related to learning outcomes: Among students who demonstrated misconceptions during group work, the more frequently students received help at the highest levels (verbally labeled explanation or numerical rule), the more likely they were to solve problems correctly on the posttest.

Second, three other conditions for learning concern how the student receiving an explanation responds after receiving help: (a) The target student must

Table 1

Continuum of Levels of Detail in Help Received

Level	Description and example
Highest	
6	Verbally labeled explanation of how to solve part or all of the problem ("Multiply 13 cents by 29, because 29 minutes are left after the first minute.")
5	Numerical rule with no verbal labels for the numbers ("This is 30, so you minus 1.")
4	Numerical expression or equation ("13 times 29.")
3	Numbers to write or copy ("Put 13 on top, 29 on the bottom. Then you times it.")
2	Answer to part or all of the problem ("I got $3.77.")
1	Non-content or non-informational response ("Just do it the way she said.")
0	No response
Lowest	

Note. Adapted from Webb, Troper, & Fall, 1995, p. 411.

understand the explanation, (b) the target student must have an opportunity to use the explanation to solve the problem or carry out the task for herself or himself, and (c) the target student must *use* the opportunity for practice by attempting to apply the explanation received to the problem at hand. In our study, students varied greatly in how actively they responded to the help they received. Table 2 gives a continuum of responses to help received, ranging from explaining or reworking the problem to giving no response. Students' level of responsiveness to help they received was significantly related to their learning outcomes. Among students who demonstrated difficulty initially, those who showed one or more instances of reworking or explaining how to solve the problem after they received help were much more likely to solve this type of problem correctly on the posttest than students who never responded at the highest level.

Applying explanations received may benefit the learner in several ways. First, while using the explanation to try to solve the problem, students may generate self-explanations that help them internalize principles and construct specific inference rules for solving the problem (Chi & Bassock, 1989; Chi, Bassock, Lewis, Reimann, & Glaser, 1989). Second, attempting to solve problems may help students monitor

Table 2

Continuum of Levels of Responses to Help Received

Level	Description and example
Highest	
6	Explains or reworks problem and produces correct answer ("One minute costs 22 cents. This is the first minute. Then there is 29 more minutes. So we have to find out how much that is. So then you times 29 times 13. That's 377.")
5	Applies another student's numerical rule and completes the problem ("So, on the first one, I need to minus 1? So, 30 minus 1 is 29.")
4	Finishes another student's calculations (Student 1: "Then you times it 29 times 13." Student 2: "OK, that's 370 . . . 377.")
3	Copies numbers or writes down numbers that are dictated (Student 1: "It's 30 minutes so you times 13 times 29. And then you get 377, right?" Student 2: "Wait up. 13 times 29? Gives what?")
2	Acknowledges help received ("OK, OK, I got it.")
1	Non-content or non-informational response. ("Oh.")
0	No response (Says and does nothing.)
Lowest	

Note. Adapted from Webb, Troper, & Fall, 1995, p. 412.

their own understanding and help them become aware of misunderstandings or lack of understanding (Chi & Bassock, 1989); otherwise they may falsely assume that they know how to solve the problems. Furthermore, observing *other* students solve problems correctly may also give students a false sense of competence (see Nelson-Le Gall, 1992). Third, attempting to solve problems may help make the group aware of a student's misunderstandings or lack of understanding. Otherwise, the group may rely on students' own admissions of whether they understand (e.g., "I get it"), which may not always be accurate (Shavelson, Webb, Stasz, & McArthur, 1988).

Not only were receiving high-level help and actively applying the help received important predictors of achievement scores in their own right, but they seem to work together in a two-stage process that is highly predictive of learning outcomes:

Level of help received —> Level of response to help received —> Achievement

First, the level of help received predicts how actively a student will respond to the help received. In our study, students who received high-level help (explanations or complete numerical rules) were more likely than students who received only numerical equations, numbers, or answers to rework the problem without assistance from other students. Second, as described above, using the help received to solve the problems strongly predicts posttest scores. Taken together, receiving high-level help increases the chances of a student to be able to use the help received, and using the help received increases the chances of learning how to solve the problems.

The failure of students to apply the help they receive may be one reason why previous research has often found that receiving help, even elaborated explanations, is not related to achievement. To benefit from receiving help, the learner must be an active participant in the learning process.

Responsibilities of the Help-Seeker and Help-Giver to Bring About Elaborated Explanations

To bring about elaborated explanations instead of numbers and answers, all students in the group have certain responsibilities.

Responsibilities of the Help-Seeker

To maximize the chance of receiving elaborated help, a student who is confused must express a need for help that clearly conveys his or her area of difficulty, misunderstanding, or lack of understanding. In order to do this, the target student must carry out the steps in Nelson-Le Gall's (1981, 1985; Nelson-Le Gall, Gumerman, & Scott-Jones, 1983) comprehensive, five-step model of children's help-seeking. The target student must be aware that he or she needs help, be willing to seek help, identify someone who can provide help, use effective strategies to elicit help (e.g., ask explicit, precise, and direct questions), and be willing to reassess his or her strategies for obtaining help.

Our observations of students working in groups showed considerable variation in stude..s' willingness to seek help—and in their persistence in asking for help, and in the nature of their requests for help (Mastergeorge et al., 2000). Some students admitted that they did not understand how to solve the problems ("I don't know how to do these myself"), but they did not ask questions, and other students in the group did not respond to their admissions of confusion. Other students demanded answers instead of assistance designed to help them learn how to solve the problems ("You have to tell me the answer"). Some students did seek help initially but, when they did not receive adequate explanations, were not persistent in asking for help. Instead, they gave up trying to understand how to solve the problem and resorted to copying others' work. Only a minority of students persisted in asking for help until they received explanations that they could understand and that helped them figure out how to solve the problems. Nearly all of the students who persisted in seeking help until they received help that they understood learned how to solve the problems; few of the remaining students learned how to solve them.

In addition to persistence, the kind of question that students asked played a role in the level of help received. Specific questions ("Why is it 29?") and specific errors ("30*$0.13" instead of "29*$0.13") were much more likely than general questions ("How do you do it?") or general statements of confusion ("I don't get it") to elicit high-level help. These findings are consistent with previous research showing that requests for help that are explicit, precise, and direct are more likely to elicit explanations than vague and indirect questions (Peterson, Wilkinson, Spinelli, & Swing, 1984; Webb & Kenderski, 1984; Wilkinson, 1985; Wilkinson & Calculator, 1982a, 1982b; Wilkinson & Spinelli, 1983). Groups may not know how to provide explanations in response to general questions, especially when there is no clue given

about the help-seeker's area of confusion. Groups may also believe that students asking general questions are too confused to be able to understand how to solve the problems, and that the most efficient response is to provide numerical procedures and answers (e.g., giving the expression 29*0.13 instead of explaining where the 29 comes from). Alternatively, groups may interpret asking general questions as a signal that the help-seeker wants only the answer, not to understand how to solve the problem, and is depending on others to do the work.

When a student asks specific questions or makes specific errors, on the other hand, it is much easier for the group to identify the student's misconception (e.g., that a student does not recognize that the first minute and later minutes in a phone call have different costs) and to formulate an explanation accordingly. Specific questions and errors also provide a signal to the group that a student is motivated to learn how to solve the problem, already has some level of understanding, and, consequently, would benefit from receiving explanations.

A final responsibility of help-seekers concerns their socio-emotional behavior, specifically taking care not to alienate potential help-givers. Some students that we observed were so disruptive, aggressive, or unpleasant to other group members (e.g., interrupting, distracting, insulting, or ridiculing others) that the group would not help them even when they asked for help.

Responsibilities of the Help-Giver

All members of the group are potential help-givers. To provide elaborated explanations requires both a willingness and an ability to do so. Willingness to give elaborated help depends partly on group norms supporting working together and helping others, and a focus on understanding and learning. An analysis of students' verbal references to norms and acceptable behavior while working together showed that groups had different perceptions about their responsibilities (Webb & Farivar, 1999). Some groups emphasized the importance of working together (e.g., "We are all supposed to do these together" or "You're supposed to be working with the group"), whereas others emphasized individual work ("You guys do your own. I'm gonna redo it" or "I like to do them on my own"). Some groups were clearly willing to provide help ("Look, if you don't know how to do it, then I'll help you" or "You need help?"), whereas others were not ("Don't ask me how to do it").

Importantly, some groups explicitly recognized the importance of explaining and understanding ("I'm just explaining to her how to do the work. See? Now I

can't reach over to just tell her how to do it" or "I can't tell you just the answer") while others dismissed explaining and understanding ("You don't understand it? You should just copy it") or justified copying as instances of "sharing ideas" ("You can copy my paper when I finish. . . . It says right there to share answers. . . . Look at the bottom [of the list on the board] before 'understanding.' Share ideas, information. We're sharing"). Perceptions about group norms corresponded to differences in the level of help given. Groups emphasizing the importance of working together, helping each other, explaining, and understanding were more likely to give high-level help than were other groups.

Not only must students be willing to give elaborated help, they must be able to clearly articulate explanations that are meaningful to the help-receiver. Giving elaborated help requires comprehension of the material, understanding of the difference between explanations and less detailed kinds of help, and an ability to express explanations clearly. In our study, students usually gave help consisting of numerical procedures or rules without verbal labeling of the numbers, as in the following example:

Student 3:	13 times 30?
Student 1:	No, 29.
Student 3:	How could it be 29?
Student 1:	Because you have to take away 1.
Student 3:	How do you get that?
Student 1:	Look. This is what you do. OK. It's 30, right? You take away 1, it's 29.

Students may give non-elaborated help because they do not realize that it is necessary to label numbers (e.g., 30 refers to the total number of minutes in the call; 1 refers to the first minute; 29 refers to the number of additional minutes in the call after the first minute) or explain the conceptual basis for numerical rules ("take away 1" refers to subtracting the first minute from the total number of minutes because the first and remaining minutes have different costs), or they may not possess the understanding themselves. Making students aware of the importance of verbally labeling numbers may help them formulate more effective explanations.

Groups must also be willing to continue giving help until the learner understands. Our analyses of the frequency of help-giving showed a sharp drop-off in the level of elaboration of explanations over time. Even when groups gave

elaborated help initially (e.g., describing rationales for the calculations), they gave lower level help as they continued to work on problems (numbers to use or calculations to carry out). And during the course of the same problem, they gave decreasingly elaborated help in response to a student's repeated requests for help. Some groups exhibited frustration at the inability of the target student to understand the explanations given and encouraged students to copy the work instead of continuing to ask for help.

Finally, it is important for students to monitor each other's work and level of understanding even in the absence of questions. In our study, some students made errors that were never detected by other members of the group.

Responsibilities of the Help-Seeker and Help-Giver to Facilitate Applying the Help Received

Responsibilities of the Help-Seeker

Of the students who received fairly elaborated help, only about half applied the help they received to try to solve problems for themselves. A critical predictor of applying the help received was students' focus on understanding rather than only obtaining the correct answer. Students who emphasized understanding, as indicated by the kinds of questions they asked ("Why is it 29?"), were much more likely to apply the help they received than were students who did not emphasize understanding. Students who did not emphasize understanding seemed to be aware of their lack of understanding ("I don't know how to do it myself" or "I got stuck here"), but they did not respond, or responded minimally, to the help they received. Most often they seemed to focus on obtaining the correct calculations to write down ("34 times 8? Or do we got to minus 1?"). These students may have believed that (a) understanding was not important, (b) they were not capable of understanding, or (c) the group would not or could not help them understand.

Responsibilities of the Help-Giver

As described above, applying the help received is a key process for learning. A major responsibility of help-givers, then, is to provide help-seekers with opportunities to solve the problems by themselves. In many cases, however, groups did not permit learners to try to solve problems without assistance. After providing help, even with an explanation ("Because you got to take away 1"), it was common for groups to immediately start to dictate the numerical procedures ("30 minutes.

So you have to times 13 times 29. And whatever it equals, add with 22") or to encourage students to copy from others' papers ("You should just copy it"). The tendency to "do" the work for others may have resulted from time pressure to complete the allotted number of problems during class time, or from the perception that dictating the numerical procedures was productive helping.

Responsibilities of the Teacher

The overarching goal of group work was for students to help each other learn how to solve the mathematics problems. The importance of having students understand how to solve the problems was a recurring and explicit theme in the activities that students carried out during the preparation for group work, in the conduct of group work itself, and in the teacher's instructions to the class. Despite this, our analyses of group work showed that the behavior of individual students, of groups, and even of the teacher often served to undermine this goal. More often than not, students focused on obtaining or giving answers or procedures and saw their task as finished if the group had correct work written down. The teacher did not often check for understanding, often focused on procedures instead of concepts, and seemed satisfied when a student or group gave the correct answer.

Our observations suggest four areas in which the teacher can help promote productive helping in small groups: (a) establishing positive norms for group work, (b) structuring the task in ways that support learning and understanding, (c) modeling desired behaviors, and (d) monitoring group work. First, teachers can establish expectations for group work that support seeking and giving help, providing elaborated help instead of only answers, focusing on understanding concepts instead of memorizing procedures, monitoring one's own and others' understanding, collaborating rather than working independently, and creating a positive group atmosphere that encourages students to contribute and test their understanding. Farivar and Webb (1994a, 1994b; see also Webb & Farivar, 1994) give example classroom charts and activities for teachers to use in the classroom.

Second, teachers can structure the task in ways that support learning and understanding. Making understanding the goal of group work is a key element. For example, requiring students to explain the concepts underlying the mathematical procedures (explaining what each number represents—"29 is the number of minutes in a 30-minute call after the first minute"—and providing verbal labels for numbers and arithmetic operations—"29 minutes times $0.13, where $0.13

is the cost per minute after the first minute") would help students become aware of each other's misconceptions and gaps in understanding. Reducing the pressure to agree on answers may also help reduce the focus on obtaining correct procedures at the expense of understanding. Assigning a small number of problems to be completed during class time and allowing ample time for their completion would help prevent groups from rushing and would allow time for students to monitor each other's understanding and to explain as often as necessary. Eliminating time pressure may also prevent the need for students to copy each other's work simply to complete the assignment. Finally, avoiding group (and possibly individual) rewards based on performance is important. Although group grades have been hypothesized to increase accountability and participation (Johnson, Johnson, & Holubec, 1988; Slavin, 1990), our observations showed that grading groups on the accuracy and completeness of their class work encouraged them to feed calculations and answers to students who did not understand the material, and encouraged those students to copy from others.

Third, teachers should model desired behaviors in their interactions with the whole class and with small groups. Instead of merely correcting errors (such as repeating questions until a student provides the correct answer: "the first one is 19 cents and then what?"; ". . . and then you have to multiply 12 times what?"; "they cost 12 cents each, so how much is that?"), the teacher could explicitly address the misconceptions underlying students' errors, try to discover the basis for them, and provide appropriate explanations. Instead of focusing only on the procedures for solving the problem (*what* to do), the teacher should also explain the conceptual basis for the procedures—such as explaining the structure of the phone call with separate costs for the first minute and the additional minutes and the resulting need to separate the total number of minutes in the call into two groups of minutes.

Fourth, teachers need to actively monitor group work. At a minimum, teachers should make sure that students work together and do not exclude anyone, are generally cooperative and willing to give help if asked, are willing to seek help from their teammates, and provide explanations instead of answers. Also important, but more difficult, is to monitor the types of explanations given in groups and intervene, when necessary, to redirect group interaction when students copy work from each other, feed each other numbers and answers to write on their papers, and describe numerical procedures and calculations without providing explanations. Recognizing when groups are engaging in different kinds of interaction requires

teachers to observe groups and listen to their conversations for extended periods of time, a monitoring process much more intensive than determining whether groups are on-task or off-task. It is clear that the teacher's role goes beyond ensuring that groups are on-task; to promote productive helping, the teacher must serve as monitor, modeler, coach, and facilitator of helping behavior that focuses on conceptual understanding.

Possible Approaches for Promoting Productive Helping Behavior

This paper has described conditions for effective helping in small groups and the responsibilities of students (both in help giving and help seeking) and teachers to bring about helping behavior that is productive for learning. The first step in ensuring that helping is productive is to raise teachers' and students' awareness of their responsibilities. The second and more difficult step is to design instruction and practice activities to enable participants to carry out these responsibilities. As this study showed, students do not automatically engage in productive help-seeking or help-giving behavior, and teachers do not always facilitate the process of productive helping.

Approaches to Promoting Effective Group Work

A number of approaches for producing effective group interaction have been developed previously; it may be possible to adapt them to promote effective help giving and help seeking both in instructional and assessment contexts. One way of preparing students for effective group work is to give them training in general interpersonal and teamwork skills that are needed for all kinds of collaborative group work. In recognition that members of a group need to know how to communicate effectively with one another, a number of educational researchers have investigated ways of preparing students to work with others. The resulting programs have focused on developing norms for prosocial behavior and specific helping skills. To encourage students to listen to others, allow everyone to participate, and resolve disagreements in constructive ways, many cooperative learning methods involve students carrying out activities that establish norms for cooperative behavior in the classroom and that help students develop and practice communication skills (e.g., Johnson, Johnson, Holubec, & Roy, 1984; Kagan, 1992; Sharan & Sharan, 1976). Some entire programs are built around prosocial development, such as the Child Development Program (Solomon et al., 1985; Solomon, Watson, Schaps, Battistich, & Solomon, 1990). This program strives to

promote a cooperative orientation in all classroom activities and designs experiences to help students develop "autonomy, self-direction, community participation, responsible decision making, being helpful to others, learning to understand and appreciate others, and learning to collaborate with others" (Solomon et al., 1990, p. 236).

Cohen, Lotan, and Catanzarite's (1990) adaptation of *Finding Out/ Descubrimiento* (DeAvila & Duncan, 1980) also helps develop cooperative norms by preparing teachers in methods of classroom management that increase students' ability to help others, listen to them, explain and demonstrate how things work, give others what they need, and ask them questions, and that make students responsible for ensuring that everyone gets needed help.

Kagan's (1992) program of cooperative learning also advocates team building, class building, and development of social skills. To help students develop social skills needed for working with others, like listening, turn taking, helping, praising, polite waiting, encouraging, appreciating, asking for help, staying on task, and resolving conflicts in nonhostile ways, Kagan described roles for students to practice skills, ways of structuring activities to elicit particular social skills, techniques of teacher modeling and reinforcement, and techniques for group reflection and planning.

In the approach of Yackel, Cobb, and Wood (1991; see also Wood & Yackel, 1990), the teacher and students mutually construct norms in the context of formal group work, including sharing, cooperating, achieving consensus about the answer, justifying one's own work, and understanding other students' procedures.

To prevent high-status students from dominating group discussions or low-status students from being left out of group work, it may be helpful for students to carry out activities designed to equalize participation of all group members. For example, Elizabeth Cohen and her colleagues (Cohen, 1973; Cohen & Roper, 1972; Cohen, Lockheed, & Lohman, 1976) have developed and tested ways to alter the depressed participation of minority students typically observed in multiracial groups. By manipulating students' expectations of each others' competence, called expectation training, Cohen and colleagues were able to equalize the participation of high-status and low-status students. In their studies, low-status students received special training on academic and nonacademic tasks and then taught high-status students how to do the tasks, thereby changing high-status students' perceptions of the competence of low-status students. When the treatment consisted only of

increasing the competence of low-status students without also manipulating the *high-status* students' expectations of low-status students' performance, the usual pattern of high-status dominance in group interaction did not change.

A less expensive and less complicated approach to altering students' expectations of each other's competence is the multi-ability intervention. This approach makes typical status characteristics less salient by making students aware that multiple skills are necessary to do the task, and by convincing students that each person has some abilities but that no single person has all relevant abilities (Cohen, 1994). This approach reduced the tendency of high-status students to dominate group activity in several studies (e.g., Rosenholtz, 1985).

Approaches to Promoting High-Level Helping in Groups

The approaches to promote high-quality group work described above focus on general themes such as communication skills. Other approaches focus specifically on promoting high-level elaboration (i.e., explaining rather than just providing answers). Farivar and Webb (1994a, 1994b) and Swing and Peterson (1982), for example, taught students explaining skills to improve their ability to teach other students in small groups. Students were given instruction and practice in giving detailed explanations of how to solve problems instead of giving only answers, and asking explicit, direct, and specific questions, shown by other researchers to be more likely to elicit explanations than vague or general questions (Peterson et al., 1984; Webb & Kenderski, 1985; Wilkinson, 1985; Wilkinson & Spinelli, 1983).

Another way of managing and facilitating group work, and a very popular one, is to assign students different management roles, each with different prescribed behavior (e.g., the "gatekeeper," who equalizes participation in the group; Kagan, 1992). Some roles require students to engage in behavior hypothesized to influence learning directly, such as summarizing and active listening. Alternately called the "learning leader" (Yager, Johnson, & Johnson, 1985) and the "recaller" (Hythecker, Dansereau, & Rocklin, 1988), the summarizer summarizes the main points of the material. To encourage active processing of material by the non-summarizing students, the "learning listener" or "listener/facilitator" is responsible for detecting errors and omissions in the summary and must ask questions of the summarizer to help clarify the material. In some cooperative learning methods, the summarizer and listener roles have been incorporated into a complex script for cooperative work (Hythecker et al., 1988; Rocklin et al., 1985).

A third approach, called reciprocal questioning methods, requires students to ask each other thought-provoking questions about the material in order to promote elaborated discussion and explanation of ideas (e.g., Fantuzzo, Riggio, Connelly, & Dimeff, 1989; King, 1989, 1990, 1992). Because different students bring different perspectives to bear on the material, the questions generated in a group and the explanations offered in response can expose students to new insights into the material. Answering each other's questions can encourage students to recognize their own misconceptions and gaps in understanding, recognize different viewpoints, seek new information to clarify what puzzles them and to resolve disagreements and differences with others, and reconceptualize and reorganize information to justify their responses or make them clearer to others. And because they know that other students may evaluate what they say, students may work harder to ask better questions and give more thoughtful answers. These processes in turn may increase their understanding and recall of the material.

Refining reciprocal questioning for use in a tutoring setting, King (1999) developed a method called "ASK to THINK—TELL WHY" to assign roles to tutor and tutee. Tutors only ask questions, typically high-level questions designed for in-depth thinking. Tutees explain, rather than merely describe, their thinking but do not ask questions. In explaining their thinking, tutees are trained to focus on telling why and how instead of telling what. This requirement may help tutors and tutees focus on conceptual understanding rather than procedural knowledge.

Still other researchers have given students specific prompts to encourage them to give elaborated explanations of scientific information and observations in collaborative small groups. Instead of having students ask each other questions to elicit elaboration, these researchers gave students guidelines to use when formulating their own explanations (e.g., comparing one's answer or perspective with someone else's), as well as when responding to others (Coleman, 1992; Palincsar, Anderson, & David, 1993).

These methods can be adapted for use in both instructional and assessment contexts that involve group collaboration. With training and practice, it should be possible for students in a variety of collaborative settings to engage in productive helping behavior to maximize learning.

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UCLA Graduate School of Education & Information Studies